tetragonal class (hemimorphic hemihedral division of the tetragonal system). So far as known, circular polarization is not exhibited by crystals with this grade of symmetry.

PETROGRAPHY.[1]

Petrography of the Bearpaw Mountains, Montana.—The Bearpaw Mountains are the dissected remains of a group of Tertiary volcanoes. Their cores of the old volcanoes are granular rocks, their lavas and tuffs are represented by basic sheets and beds. The lavas are largely basalts, leucite-basalt and other similar basic types.[2]

The cores consist of mica-trachytes, quartz-syenite, porphyries, containing aegerite-augite and anothoclase-phenocrysts, in which are imbedded microlites of oligoclase, trachytes containing hornblende and diopside and shonkinite. A few miles from Bearpaw Peak a denuded core is exposed, which furnishes a good example of the differentiation of a syenite in place. The intrusion is laccolitic in character. Around its borders it has highly altered the sedimentary rocks with which it is in contact. The most acid portion of the laccolite is a light aplitic syenite containing quartz and diopside. The main mass is a more basic syenite resembling monzonite or yogoite. It contains diopside and much plagioclase. The most basic phase is a shonkinite. Analyses for the three principal types follow:

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O_5	Other	Total
Quartz-syenite	68.34	15.32	1.90	.84	.54	.92	5.45	5.62	.45	.57	= 99.95
Monzonite	52.81	15.66	3.06	4.76	4.99	7.57	3.60	4.84	1.09	1.86	=100.24
Shonkinite	50.00	9.87	3.46	5.01	11.92	8.31	2.41	5.02	1.33	2.68	=100.01

The totals corrected for Fe and Ce are 99.94, 100.22 and 99.93 respectively.

Two French Rocks.—In the serpentine of St. Préjet-Armadon, Haute-Loire, France, Lacrou[3] finds nodules composed of asbestiform gedrite surrounding a kernel of serpentine or biotite. The nodules are separated from the serpentine by an envelope of biotite. They are sup-

[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] Weed and Pirson: Amer. Journ. Sci., IV, Vol. 1, p. 283 and 351.

[3] Bull. Soc. Franc. d. Min., XIX, p. 687.

posed to be of secondary origin. Bronzite and asbestus both occur in the rock. In the norite area of Arvien, Auvergne, the same author describes a variety of this rock which is characterized by the presence of secondary reaction, rims of anthophyllite and actinolite between its hypersthene and plagioclase, the former appearing next to the pyroxene. The plagioclase of the rock is often altered to actinolite, garnet and albite, while the hypersthene is changed to an aggregate of anthophyllite.

The Granite of the Himalayas.—McMahon[4] describes the granite of the N. A. Himalayas. Although highly foliated in the borders of its masses, the rock is shown to be eruptive. The author thinks the foliation is due to pressure upon the rock before it finally solidified. He attempted to show that this schistosity could not possibly have been produced after the rock cooled. The granite is coarsely porphyritic with large orthoclase crystals in a medium to fine grained groundmass composed of the usual constituents of granite. This is cut by tiny veins of quartz which are supposed to represent the micrystallized residue left after the first partial consolidation of the rock, or to be the result of a partial fusion of the quartz grains originally occurring in it. This quartz, though it presents the usual aspects of secondary quartz, is thought to have been injected into the vein spaces while it was in a molten condition. Sinuous areas and viens of microcrystalline mica are likewise observed in the granite, and these are thought to have been produced by the rapid crystallization of mica that had been melted, and not by the crushing and shearing of the original micas nor by secondary processes of any other kind. The paper is well illustrated by photo-micrographs.

California Rocks.—Fairbanks[5] describes the rocks of Eastern California between Mono Lake and the Mojave desert as comprising both sedimentary and igneous forms. Among the latter are both granitic and volcanic varieties. The granites form the eastern slope of the Sierra Nevadas. In the northern portion of the area it is a coarsely porphyritic biotite hornblende variety. In the southern portion it is replaced by a more basic phase containing less hornblende. The volcanic rocks met with in the district are andesitic flows, dykes and tuffs, and basalt flows among the more recent rocks and liparites among the more ancient ones. The microscopical description of the type is deferred to a later paper.

[4] Proc. Geologists Association, Vol. XIV, p. 287.

[5] Amer. Geologist, Vol XVII, p. 63.

Turner[6] gives a classification of the igneous rocks studied by himself from various places in California. He divides them into families in accordance with their mineralogical composition, including in the same family all those rocks with the same composition irrespective of structure. He then takes up the syenites and discusses them in some detail. The family is made to include syenites (granular), syenite-porphyries (porphyritic) and trachytes (microlitic and glassy) and apotrachytes. The syenites include soda-syenite or albitite, augite-syenite, hornblende-syenite and mica-syenite. The apo-trachytes include among other rocks Rosenbusch's orthophyres and keratophyres. Until very recently no rocks of the syenite family have been proven to occur within the borders of the State. All those rocks described as such are now known to be hornblende-andesites, granites or diorites. The author refers briefly to the known occurrence of the syenites in the State and describes more fully some new ones.

He reports dykes of white albitite-porphyries or soda-syenite porphyries in the rocks of the Mother lode quartz mines. In the bed of Moccasin Creek the rock consists of quartz, muscovite and albite, but in other places it consists almost exclusively of albite with a few grains of an olivine-green mineral thought to be aegerite. The rock resembles somewhat Brögger's sölosbergite and Palache's albite rock containing crossite. An analysis of one specimen gave:

SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	K_2O	Na_2O	H_2O	P_2O_5	Total
67.53	.07	18.57	1.13	.08	.55	.24	.10	11.50	.46	.11	=100.34

Gabbro-Gneiss from Russell.—The gabbro of Russell, St. Lawrence Co., N. Y., is said by Smyth[7] to change its character rapidly in consequence of a variation in grain from moderately fine to very coarse, in structure from porphyritic to granular and in color from black to gray. Upon alteration the gabbro passes into a rock made up of red masses in a groundmass of gabbro. In other places it becomes schistose, when it takes on a granulitic texture. Sometimes hornblende is developed in it in long narrow plates that run approximately at right angles to the schistosity, causing the rock to resemble a metamorphosed sediment. Even in the most gabbroitic varieties of the rock the plagioclase is changed into an aggregate of secondary products, among which scapolite is the most common. In the change of the massive gabbro into the schistose variety the constituents are first

[6] Ib., Vol. XVII, p. 375.

[7] Amer. Jour. Sci., Vol. 1, p. 273.

granulitized and then drawn out into lenticular areas. The feldspars of the gneisses appear to have been recrystallized, since the feldspathic areas consist of single feldspar individuals and not fragments of grains. The pyroxene also differs from the gabbro pyroxene. It has lost its characteristic black inclusions and has assumed a deep green color. This mineral, as well as the hornblende, which is abundant in the gneisses, are both regarded as having recrystallized, the augite material coming from the original augite of the gabbro and the hornblende from the secondary amphibole so common in the gabbro. The gneisses are thus schistose gabbros in which recrystallization has taken place with attendant granulitization. The author points out the fact that in the first stages in the alteration of the gabbro scaly hornblende and scapolite are formed, while in the final stage they have completely disappeared, and in this latter stage there results a gneiss which bears no evidence of having been crushed.

Notes.—The serpentine near Bryn Mawr, Penna., has resulted by the alteration of a peridotite according to Miss Bascom.[8] The rock of the Conshohocken dyke is a typical diabase.

GEOLOGY AND PALEONTOLOGY.

Fossil Jelly Fishes.—Certain curious forms, locally known as "star cobbles," have long been found in the middle Cambrian shales and limestones of the Coosa Valley, Alabama. They occur at two horizons associated with silicious concretions. The "star cobbles" are recognized by Mr. Walcott as fossil medusæ, and among the 8,000 specimens now in the collections of the U. S. Geological Survey he has separated two types allied to the recent Discomedusæ. From the large number of specimens that have been found over a relatively small area, it is evident that they were gregarious and very much like the modern Rhizostome (*Polyclonia frondosa*) in their habits.

The author describes three species, and refers them to two new genera, Brooksella and Laotira, which he also defines. These forms, *Brooksella alternata, B. confusa* and *Laotira cambria,* together with *Dactyloidites asteroides,* the author groups in the family Brooksellidæ, and gives a diagnosis of the family.

[8] Proc. Amer. Acad. Science, 1890, p. 220.